

REMARKS

This Amendment responds to the Office Action mailed November 3, 2004 in the above-identified application. Based on the foregoing amendments and the following comments, careful reconsideration and allowance of the application are respectfully requested.

Claims 1-16 were previously pending in the application. By this amendment, claims 1-5 and 7-16 are amended, and claim 6 is cancelled. New claims 17-24 have been added. The amended claims and the newly-added claims find clear support in the application as filed at least at page 15, line 30 to page 17, line 9. No new matter has been added. Accordingly, claims 1-5 and 7-24 are pending in the application, with claims 1, 18, 20 and 22 being independent claims.

The Examiner has rejected claims 1-16 under 35 USC §103(a) as unpatentable over Tschudi et al. (US 6,785,407) in view of Raynal et al. (US 6,643,389). The rejections are respectfully traversed.

Tschudi discloses a fingerprint sensor mounted on a U-shaped member (Fig. 2 and col. 3, lines 49-52). The sensor may be a single row or a double row of sensor elements. The sensor elements may be pressure or temperature sensors, but preferably are electrical conductors to measure conduction, impedance or capacitance on different parts of the fingerprint (Figs. 1A and 1B and col. 2, lines 58-63). Velocity is measured by correlating similar features measured at different times at different sensor elements (col. 3, lines 34-40 and col. 4, lines 15-20).

Raynal discloses a two-dimensional array of capacitive fingerprint sensors, each cell of the array having a pair of conductors (Figs. 2 and 3). The array is smaller in one dimension than the fingerprint and requires assembling partial fingerprint images into a complete fingerprint image (col. 2, line 65 to col. 3, line 6). A mouse device positioned adjacent to the array in the path of fingerprint movement provides fingerprint movement speed information to the scan control unit (col. 3, lines 12-17 and col. 3, lines 50-60).

Amended claim 1 is directed to finger sensing apparatus comprising two or more finger detectors spaced apart along an expected direction of movement of a finger, each of the finger detectors including at least one drive plate and at least one pickup plate, wherein the finger detectors are dimensioned and spaced to sense a bulk of a finger rather than fingerprint features, and wherein an end of a finger passing over each of the finger detectors produces a change in capacitance between respective drive plates and pickup plates.

It may be helpful to describe an example of use of the claimed finger sensing apparatus. A finger is swiped over a fingerprint sensing system including an image sensor and finger sensing apparatus. All the finger detectors of the finger sensing apparatus are scanned at a speed which is effectively instantaneous relative to the speed of the finger to obtain a "snapshot" of the finger position. The finger detectors are dimensioned and spaced to sense the bulk of the finger rather than fingerprint ridges and valleys. Each finger detector either senses the finger or does not sense the finger. The transition from finger sensed to finger not sensed indicates the position of the finger end. Multiple snapshots of the finger are acquired, with the movement of the finger creating an effect similar to a moving windowshade. The change in position of the finger end is indicative of finger velocity. Thus, finger velocity is determined as the fingerprint is acquired by the image sensor.

Tschudi does not disclose or suggest finger sensing apparatus comprising two or more finger detectors spaced apart along an expected direction of movement of a finger, as claimed. Tschudi discloses a sensor including sensor elements having a resolution of 50 μm (col. 3, lines 4-5) to sense fingerprint features. Velocity is determined by correlating similar fingerprint features measured at different times. This approach is very different from sensing an end of a finger passing over finger detectors as claimed. At a given instant of time, the finger may cover some of the finger detectors and not others. The finger detector outputs together indicate the position of the end of the finger. At a different time, the position of the finger end changes, making it possible to determine finger velocity. The finger detectors of the present invention are dimensioned and spaced to sense the bulk of a finger rather than fingerprint features. The Tschudi approach, wherein fingerprint features are correlated at different times, is very different from the present invention.

The Raynal patent does not provide the teachings that are lacking in Tschudi. As noted above, Raynal senses partial fingerprint images and assembles the partial images into a complete fingerprint image. A mouse device is positioned in the path of finger movement and provides finger movement speed and direction information. The mouse device is quite different from the claimed finger sensing apparatus.

In summary, Tschudi teaches determining finger velocity by correlating similar features measured at different times. Raynal provides an alternate velocity measurement technique in the form of a mouse device that is positioned to contact the finger as the finger is swiped over the

array. Both approaches are very different from the present invention. Accordingly, amended claim 1 is clearly and patentably distinguished over Tschudi and Raynal, taken individually or in combination.

Amended claims 2-5 and 7-16 depend from claim 1 and are patentable over Tschudi in view of Raynal for at least the reasons discussed above in connection with claim 1.

New claim 17 depends from claim 1 and is patentable over Tschudi in view of Raynal for at least the reasons discussed above in connection with claim 1.

New claim 18 is directed to a fingerprint sensing system and requires an image sensor and a finger sensor as defined in amended claim 1. New claim 18 and dependent claim 19 are patentable over Tschudi in view of Raynal for at least the reasons discussed above in connection with claim 1.

New claim 20 is directed to a method for sensing a finger comprising sensing a bulk of the finger, rather than fingerprint features, with finger detectors spaced apart along an expected direction of movement of a finger. Claim 20 and dependent claim 21 are patentable over Tschudi in view of Raynal for at least the reasons discussed above in connection with claim 1.

New claim 22 is directed to finger sensing apparatus comprising two or more capacitive finger detectors spaced apart along an expected direction of movement of a finger, wherein the finger detectors are dimensioned and spaced to sense a bulk of the finger rather than fingerprint features. Claims 22-24 are patentable over Tschudi in view of Raynal for at least the reasons discussed above in connection with amended claim 1.

CONCLUSION

A Notice of Allowance is respectfully requested. The Examiner is requested to call the undersigned at the telephone number listed below if this communication does not place the case in condition for allowance.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicant hereby requests any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, that is not covered by an enclosed check, please charge any deficiency to Deposit Account No. 23/2825.

Respectfully submitted,
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